

What is claimed is:

5 1. A piezoelectric element driving circuit for driving a plurality of piezoelectric elements disposed in a plurality of head units, comprising:

a plurality of power amplifiers for driving the plurality of head units;

a plurality of flexible flat cables disposed between said plurality of power amplifiers and the plurality of head units for connecting the plurality of head units and said plurality of power amplifiers; and

a drive waveform signal generating circuit for supplying a drive waveform signal to said plurality of power amplifiers and the plurality of head units,

wherein each of the plurality of head units has:

a switch device for supplying a piezoelectric element current to the plurality of piezoelectric elements,

wherein said plurality of power amplifiers are disposed corresponding to the plurality of head units, said plurality of power amplifiers supplying a drive waveform signal that is input from said drive waveform signal generating circuit to said plurality of power amplifiers through said plurality of flexible flat cables so as to drive the plurality of head units.

2. The piezoelectric element driving circuit as set forth in claim 1,

wherein said plurality of power amplifiers amplify the drive waveform signal that is output from said drive waveform signal generating circuit to the piezoelectric elements, said plurality of power amplifiers are connected to the respective head units,

and the time constant of said plurality of power amplifiers are suppressed so as to control the velocities of inks sprayed from the plurality of head units.

5 3. The piezoelectric element driving circuit as set forth in claim 1,

wherein the plurality of piezoelectric elements of the plurality of head units are vibrated so as to spray large ink droplets, middle ink droplets, or small ink droplets, and

wherein when the small ink droplets are sprayed, the drive waveform signal is generated for a time constant that allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.

4. The piezoelectric element driving circuit as set forth in claim 1,

wherein the head units are a yellow head unit, a magenta head unit, a cyan head unit, and a black head unit that spray yellow ink, magenta ink, cyan ink, and black ink, respectively,

wherein the head units spray large ink droplets, middle ink droplets, or small ink droplets of the individual colors corresponding to the number of piezoelectric elements of each of the head units connected to said plurality of power amplifiers and the level of the drive waveform signal, and

wherein when the small ink droplets are sprayed, the drive waveform signal is generated for a time constant that allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.

5. The piezoelectric element driving circuit as set forth in claim 2,

wherein the plurality of piezoelectric elements of the plurality of head units are vibrated so as to spray large ink droplets, middle ink droplets, or small ink droplets, and

wherein when the small ink droplets are sprayed, the drive waveform signal is generated for a time constant that allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.

6. The piezoelectric element driving circuit as set forth in claim 2,

wherein the head units are a yellow head unit, a magenta head unit, a cyan head unit, and a black head unit that spray yellow ink, magenta ink, cyan ink, and black ink, respectively,

wherein the head units spray large ink droplets, middle ink droplets, or small ink droplets of the individual colors corresponding to the number of piezoelectric elements of each of the head units connected to said plurality of power amplifiers and the level of the drive waveform signal, and

wherein when the small ink droplets are sprayed, the drive waveform signal is generated for a time constant that allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.

7. A piezoelectric element driving method for driving a plurality of piezoelectric elements disposed in a plurality of head units, each of which has a plurality of power amplifiers for driving the plurality of head units, a plurality of flexible flat cables for connecting the plurality of head units and said plurality of power amplifiers, and a drive waveform signal generating circuit for supplying a drive waveform signal to the plurality of head units,

the method comprising the steps of:

driving the plurality of power amplifiers so as to amplify the drive waveform signal; and

causing the plurality of head units to spray large ink droplets, middle ink droplets, or small ink droplets corresponding to the drive waveform signal that is output from the drive waveform signal generating circuit,

wherein when the small ink droplets are sprayed, the time constant of the plurality of power amplifiers that are driven allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.

8. The method as set forth in claim 7,

wherein the time constant of the plurality of power amplifiers that are driven is equal to or smaller than a predetermined value of which all the plurality of piezoelectric elements are driven in the case that all outputs of a latch circuit that latches an output of a data serial parallel converter of each of the plurality of head units are turned on and all switches connected to all the piezoelectric elements are turned on.

9. A piezoelectric element driving circuit for driving a plurality of piezoelectric elements disposed in a plurality of head units, comprising:

a plurality of power amplifiers for driving the plurality of piezoelectric elements disposed in the plurality of head units;

a plurality of first switch devices, disposed corresponding to said plurality of power amplifiers, having a plurality of connection/disconnection switches whose input side is short-circuited;

a plurality of flexible cables connected to the connection/disconnection switches of said plurality of first switch devices; and

5 a plurality of second switch devices, disposed corresponding to said plurality of head units, having a plurality of connection/disconnection switches whose input side is connected to said plurality of flexible cables and whose output side is short-circuited and connected to the plurality of head units,

10 wherein the output side of the connection/disconnection switches of said plurality of first switch devices and the input side of the connection/disconnection switches of said plurality of second switch devices are paired and connected,

15 wherein the connection/disconnection of the connection/disconnection switches of said plurality of first switch devices and said plurality of second switch devices is controlled corresponding to the number of piezoelectric elements to be driven so as to decrease the time constant of said plurality of power amplifiers to a predetermined value or less.

20 10. The piezoelectric element driving circuit as set forth in claim 9,

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wherein the plurality of piezoelectric elements of the plurality of head units are vibrated so as to spray large ink droplets, middle ink droplets, or small ink droplets, and

25 wherein when the small ink droplets are sprayed, the drive waveform signal is generated for a time constant that allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.

11. The piezoelectric element driving circuit as set forth

in claim 9,

wherein the head units are a yellow head unit, a magenta head unit, a cyan head unit, and a black head unit that spray yellow ink, magenta ink, cyan ink, and black ink, respectively,

5 wherein the head units spray large ink droplets, middle ink droplets, or small ink droplets of the individual colors corresponding to the number of piezoelectric elements of each of the head units connected to said plurality of power amplifiers and the level of the drive waveform signal, and

10 wherein when the small ink droplets are sprayed, the drive waveform signal is generated for a time constant that allows the number of piezoelectric elements that are simultaneously driven becomes the maximum.